productive performance and egg quality of brown-egg laying hens from 22 to 59 wk of age. The design was completely randomized with 6 treatments arranged as a 2 × 3 factorial with 2 mill types used for grinding (hammer vs. roller) and 3 cereals (barley, wheat, and corn). Each treatment was replicated 7 times and the experimental unit was an enriched cage with 10 hens. Mean particle size (MPS) was higher for the barley than for the corn diet with that of the wheat diet being intermediate. The difference in MPS observed was higher when the roller mill was used than when the hammer mill was used. Moreover, the use of the roller mill reduced the proportion of small particles (<160μ) in the corn and wheat diets but not in the barley diets. An interaction between main cereal of the diet and type of mill used to grind the cereal was detected for ADFI ($P < 0.01$) and egg production ($P = 0.09$). Both traits showed similar values across diets when the cereal was hammer milled but when the cereal was rolled values were lower for the barley than for the wheat or corn diets. None of the other productive variables (egg weight, egg mass, feed efficiency per kg or dozen of eggs, BW gain, and mortality) was affected by dietary treatment. Egg quality traits (dirty eggs, egg shell, albumen height, and relative weight of shell, yolk, and albumen) were not affected by dietary treatment. We conclude that roller mills can be used successfully for grinding low fiber cereals (corn and wheat) destined to the production of feeds for laying hens. However, the use of roller mill might not be adequate when barley is the main cereal of the diet.

Key Words: barley, corn, hammer mill, roller mill, wheat

P404 Variation among origins in nutrient composition and protein quality of soybean meals. P. G. Rebollar, C. de Blas, M. A. Ibañez, R. Lázaro, L. Cámara, and G. G. Mateos*, *Universidad Politécnica Madrid, Madrid, Spain.*

Nutrient composition of soybean meal (SBM) depends on country of origin and crop year. Over a 5-yr period (2007–2011), a data set of SBM samples (126 from ARG, 113 from BRA, and 148 from USA) was collected and analyzed for chemical components, AA, and protein quality traits. All variables studied except Na and Mg contents, differed among origins. In this research we studied if the variability in composition and protein quality of SBM of the 3 countries could be better estimated adding extra samples to the 2007–2011 data set. A total of 90 samples (n = 30 per country) were collected in 2012 and the analytical results were included in the previous data set (PDS) to get a wider data set (WDS). Data from PDS and WDS were analyzed with ANOVA and bean origin as the main effect. The estimated variances of the residuals from PDS and WDS models were compared using an F test. The signification levels ($P < 0.001$) of the differences for major variables among origins were similar in both models. The estimation of the effect of bean origin on the variability of major chemical components (CP, ash, ether extract, NDF, and sugars), except stachyose, was not improved by increasing the number of samples in the model. However, for Ca, Mg, and Mn contents, the WDS model increased ($P < 0.001$), and for Na and Fe decreased ($P < 0.05$) the residual variance compared with PDS model. The estimation of the effect of bean origin on KOH solubility ($P < 0.001$) and TIA ($P < 0.01$) were improved in the WDS model as compared with the PDS model whereas no differences for PDI and UA were observed. On CP basis, Lys ($P < 0.05$) variation due to origin increased ($P < 0.05$) and that of Cys, Leu, Val, and His decreased ($P < 0.001$) when extra samples were added to the model. It is concluded that no extra SBM samples of the data set is needed to improve the accuracy of comparisons among SBM origins for major nutrients and protein quality traits. However, additional samples could improve the estimation of variation due to origin for some protein quality indexes and AA profile.

Key Words: chemical composition, origin, soybean meal

P405 Correlations between chemical assays and near-infrared reflectance spectroscopy for nutrient components and correlations between nutrients and color scores of distillers dried grains with solubles. A. Y. Pekel*[1], E. O. Cakir[2], M. Polat[1], K. Cakir[1], G. Inan[3], and N. Kocabagli[1], *[1]Istanbul University, Istanbul, Turkey, [2]Pendik Veterinary Control and Research Institute, Istanbul, Turkey, [3]Optima Nutritional Products Inc., Lüleburgaz, Kırklareli, Turkey.*

The objective of this research was to evaluate the nutritional composition of DDGS samples (8 wheat and 7 corn) marketed in Turkey. The samples were analyzed either by NIRS or wet chemical procedures. Color (CIE L* a* b*) characteristics of the samples were measured on the selected parts of the feeds. Correlation coefficients showed good agreement between NIRS and wet methods for the determination of selected nutrients except DM. Highest coefficients of variations (CV) were observed for fat among the nutrients tested. Strong negative correlations were found between ash and ADF (−0.811), ash and NDF (−0.649), ash and CF (−0.757) when determined by wet analyses. Phosphorus and GE had negative correlations with fiber fragments. The values for a* were found to be inversely correlated to the CF, ADF, and NDF contents found in both methods. On the contrary, there was a positive correlation between a* values and ash content in both methods. Positive correlations also were found between fat content and L* and b* values of the ingredients. Negative correlations were found between b* value and CP, Arg, Ile, Gly, and Pro levels. These results suggest that the NIRS is a precise method and the correlations found among nutrients and between color and nutrients must be taken into consideration to predict nutrient content of DDGS. No antibiotic residue found in the samples.

Key Words: DDGS, nutrient profile, NIRS, color score, correlation

P406 Effect of age in determining preference and palatability for plant proteins by broiler chickens. R. B. Agivale*, E. Y. Opoku, and T. A. Scott, *Department of Animal and Poultry Science, University of Saskatchewan, Saskatoon, SK, Canada.*

It is recognized taste perception can have significant effects on feed intake and subsequent growth. In this study influence of age on preference and palatability was studied on 432 Ross 308 male broilers between 0 to 21 d. A total of 12 treatments were tested using 4 nutrient equal broiler starter diets with 1 of 4 plant proteins (PC): (1) canola protein concentrate (CPC; 10%); (2) pea protein concentrate (PPC; 15%); (3) CPC and PPC (CPC (5.0)+PPC (7.5) %); and (4) canola meal (CM; 10%) fed in a separate feeder from a diet with 5% fish meal (FM). The preference tests were made using 6 cages of 6 male broilers started on the PC diets at 0, 7 or 14 d, and fed ad libitum to 21d. Prior to starting preference tests at 7 or 14 d, broilers were fed a commercial broiler starter diet containing none of the test ingredients. The treatments are arranged in 4x3 factorial to measure preference of 4 PC source in comparison to FM with observations starting at 3 ages (0, 7 or 14 d). In the 0–21 d group there was significantly ($P < 0.01$) greater preference for the FM as compared with the PC diets, the effect was more pronounced in the first week, but was still significant in the third week. In broilers started on preference tests at 7 d, significant ($P < 0.05$) preference for FM over PC diets was observed during the first week; while, preference was reduced but still significant ($P < 0.05$) in the second week. The magnitude of the preference for PC diets over FM diets was consistent (PPC < CPC+PPC < CPC, indicating maximum aversion for PPC diets. Significant ($P < 0.01$) interactions between age and diet were observed with respect to selection of FM/PC ratios during wk 1, 2 and 3. In conclusion, these comparisons indicate that younger birds had a stronger preference for FM diets. This model will be used in upcoming studies